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## Hybrid Cloud Computing with Security Aspect

Omprakash Sharma

School of Information Technology  
MATS University Raipur (CG)

Parag Das

School of Information Technology  
MATS University Raipur (CG)

Rahul Kumar Chawda

School of Information Technology  
MATS University Raipur (CG)

### Abstract:

Today a cloud computing (2C) is a new emerging technology to use our all industry as well as government sector. But most of the private sector, public sector and government sector all are used a hybrid cloud technology. 2C will make or become different the traditional business relations in outsourcing. It will develop a trend to set up short period ad hoc relations. Hybrid cloud (HC) Basically in this system we have a composition of two or more clouds (on-site private, on-site community, off-site private, off-site community or public) that remain as distinct entities but are bound together by standardized or proprietary technology that enables data and application portability. Most important software tools use in HC that will be present in this paper.

Keywords - Cloud Computing, Hybrid Infrastructure, Risk Management, IT Security.

### 1. Introduction

Cloud Computing is a technology which generally emphasis on providing Infrastructure, Platform, Software as a services over internet (i.e. Cloud).

### Types of Services Offered by Cloud Computing

#### 1. Infrastructure as a Service (IaaS) -

When Infrastructure such as Virtualization feature is offered over or through internet then it is known as Infrastructure as a service or IaaS. It may include Virtual Private Network(VPN), providing Operating System through virtual machine over internet.

E.g Oracle Virtual Box, VMware EXS and EXSi etc.

#### 2. Platform as a Service (PaaS) -

When platform such as Computing platform which generally includes Operating System, Integrated Development Environment (IDE) For Programming Language Execution, Database and Web Server. Any developer can develop their software and application and deploy it over cloud worrying about underlying hardware and software requirement as cloud automatically scales or adopt itself to changing environment and necessity. In short, it is flexible. This type of

computing service over cloud is known as Paas(Platform as a Service).

E.g Microsoft Azure and Google App Engine.

3. **Software as a Service (SaaS).**- It generally means providing software or application over internet (generally termed as cloud in case of cloud computing ) is termed as SaaS. It may also referred to as -On Demand Software. Thus, it can be provided according to the client requirement, demand, request and necessity and generally follows pay per use approach or scheme for payment.

### Types of Cloud (In terms of Cloud Computing)-

1. **Private Cloud** – The cloud infrastructure established, created, operated, maintained and managed by an enterprise, organization. Or it may be managed by third party and may exist on premises or vicinity and may be off premises or vicinity. And it may offer its cloud on payment basis.
2. **Public Cloud** – The Cloud Infrastructure made available for general public use or for industrial and enterprise purpose generally owned by an organization offering or providing their cloud as a service.
3. **Community Cloud** – The Cloud Infrastructure shared by multiple organizations generally supporting a particular organization having shared or common concern (e.g. Compliance Consideration, Policy, Security Requirement and Mission) .It may be managed by an organization or by third party. And may have its premises.

4. **Hybrid Cloud** – The cloud infrastructure comprising of two or more clouds i.e. public, community or private but is a unique entity in itself. And they are bound by some standards agreed by all the company or organization and proprietary technology which give ability for data and application portability (e.g. Cloud Bursting Technology).

**Source – Trend Micro: Addressing Security in cloud.**

### 2. Hybrid Cloud

Hybrid clouds are the integrated clouds incorporating and utilizing all the clouds i.e. public private and community clouds to perform many types of distinct functions within the same organization or Enterprise. Every cloud has its benefit. Utilizing public cloud services for non sensitive operations and minimal use of private cloud where it is required gives an edge over others and efficiency and seamless integration.

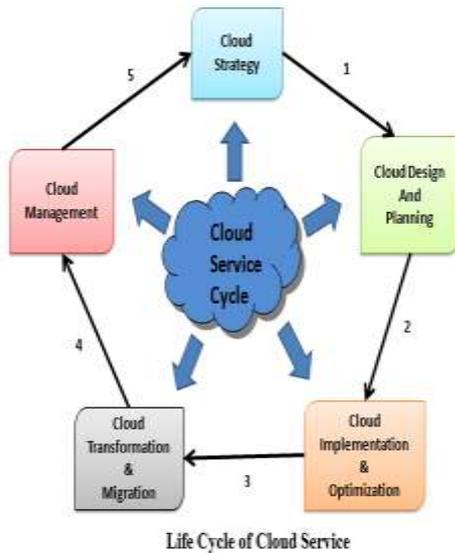


### Implementation of Hybrid Cloud

There are number of ways in which hybrid cloud can be implemented. Some of them are –

1. Two different cloud provider team together to provide integrated services comprising of both private and public cloud.

2. Complete hybrid package offered by individual cloud provider.
3. Using or signing up for public cloud by organization having their private cloud with which they can integrate.



### Features of Hybrid Cloud

**Cost Effective:** - The demand nature of service allow company to rescue money, while also saving from IT staff deficiency since the service is to the full extend In order by the provider. Company can provide infrequent services using extensively computing resource from cloud service provider, and they quickly attach and recapture IT efficiency to meet peak and fluctuating service demand while only paying for actual capacity used.

**Increase Storage:** - Provider can supply reasonable amount of storage space than an individual company may have or buy on its own.

**Flexibility:** - Cloud computing offers efficient flexibility and adoptive approach to enterprise and corporate challenging environment.

**Mobility:** - Global access is one of the key benefits of cloud computing i.e. any user can access any desired service from anywhere.

**Scalability:** - Provision for rapid or quick and flexible service deployment, according to unpredictable and ever changing service, requirement, demand, enterprise and corporate environment.

**Energy Efficiency:** - Generally cloud systems requires less energy compared to large data centre, server form has 24/7 energy requirement. And also require power to cool down the server and data centre as they release huge amount of heat energy. Whereas cloud system requires low maintenance and thus saves power.

**Eco-Friendly:** - These traditional work station such as large data centre and server farm have high carbon footprints as these have huge energy consumption, therefore it has negative effect on environment.

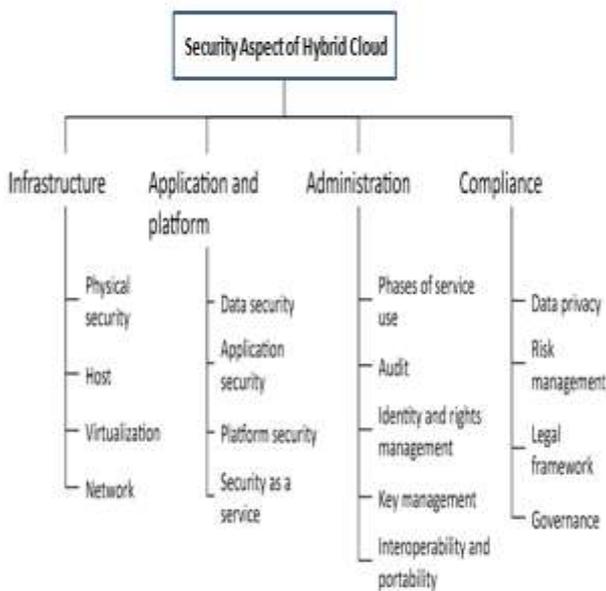
**Data Security:-** As most of the data of devices such as laptop, tablet, and mobile are saved or stored on cloud storage, it will remain safe even though devices may get stolen, damaged, misplaced and corrupted, you can still access your personal files from anywhere through your account

### Architecture of Hybrid Cloud



## Hybrid Computing Security Aspects

The assortment consists of four categories. These are – infrastructure, application & platform, administration, and adherence or compliance. In simple words, assortment of Hybrid Cloud Security Aspects maps the risks and other factors



**1. Infrastructure** – This area concerns about the security threat or issue that may occur on infrastructure layer. This layer is divided into four areas – Network, Host, virtualization and Physical Security. These areas constitutes core component of Cloud Infrastructure. In general, users do not have any influence on these core components.

It is very difficult for users to evaluate their security due to complexity of cloud infrastructure.

**2. Application and Platform** – The risk arises during deployment, development

and use of cloud services. These may have their origin from both application provided as a services and infrastructure and associated platform as well.

Security concerning data, applications and processes in cloud computing generally originates from service oriented architecture and web applications.

**3. Administration** – Administration of cloud services are the key challenges faced by many firms by security perspective. And still there is little support given to the cloud providers. And there is ongoing research in this direction.

**4. Compliance** – This refers to domains which brings and enforce regulations regarding security including laws and regulations regarding data storage and processing in cloud computing system. Risk management is also proposed for cloud consumer. Important security guidelines, certificates and standards were also imposed for governance.

## Conclusion

Well, Hybrid Cloud computing is the next generation of cloud computing. It has a wide range of scope and application in various fields. It is the future of Enterprise computing. And still increasing and every day new applications in various fields are discovered. It's undergoing large scale research and development by many countries.

And near future we will be seeing new era of computing.

Internet of things is next big tech innovation in Cloud Computing.

But, there are many unanswered questions that has to be answered and there are some cyber threats and issues that has to be checked specially in today's environment where there is wrong cyber activities such as data breach, data theft, identity theft, cyber espionage and cyber war is becoming common.

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